THE GENUS *ACUARIA* BREMSER (NEMATODA: SPIRURIDA) IN AUSTRALIA

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Summary

This paper lists all the known Australian species of the genus *Acuaria* (sens. str.). The degree of infestation in families of passerine birds is indicated in a table. New species described include *A. petterae* of which males, with or without females, are recorded from *Lalage leucomela* (type host), *Meliphaga virescens*, *M. plumula*, *Cracticus nigrogularis*, *Artamus melanops*, *Cinclosoma cinnamomeum*, *Myiagra inquieta*, and *Drymodes brunneopygia*, and females, probably of this species, from *Acanthogenys rufogularis*, *Anthochaera carunculata* and *Oreoica gutturalis*. Other new species are *Acuaria collaricinclae* from *Collaricincla rufiventris*; *A. microecae* from *Microeca leucophaea*; and *A. mirafrae* from *Mirafra javanica*. Measurements and some redescription are given of *A. anthuris* from *Corvus melanops*, *C. coronoides*, *C. bennetti* and *C. orru*; *A. streperina* from *Strepera versicolor*; and *A. skrjabini* from introduced aviary finches, *Taeniopygia castanotis*, *Lonchura malacca* and *Estrilda melpoda*.

Characters considered useful in distinguishing species of this genus are cordon length and pattern, the shape and ratio of the lengths of the spicules, and the number and arrangement of the caudal papillae of the male. A key to most of the known species, based on male characters, is also given.

Introduction

Almost all known species of the genus *Acuaria* Bremser (sens. str.) are from passerine birds of the order Oscines; there appears to be only one exception to this: *A. upupa* Rasheed, 1960, from the coraciiform bird *Upupa epops* from India. *Acuaria* spp. have been recorded from galliform and gruiform birds, and from cormorants, herons and birds of prey, but all species, of which the male is described, are found to belong to related acuariid genera. Where only the female is described, identification of the genus is uncertain, but may be inferred from the cordon structure, if this is described.

The incidence of *Acuaria* (sens. str.) species in birds dissected in this department is shown in Table 1. Crows are by far the most commonly infected and are also the most heavily infested birds, perhaps however, only because of the greater size of the gizzard. Of the 21 smaller passerines listed, belonging to 14 species, none yielded more than three specimens, and eight birds contained only females. Under these conditions (and these apparently pertain also in other places—see Chabaud & Petter 1961), it is almost impossible to be certain of the variation within a species. However, in the present material, two species are present in some numbers. *A. anthuris* from *Corvus* spp., and *A. skrjabini* from imported finches (cagebirds) among which a heavy infestation occurred. Within each of these species there is a close agreement in certain characters: the

TABLE 1

Incidence of Acuaria *spp., and of nematodes generally, in "land birds" dissected. Numbers refer to specimens, not species.*

Bird group	Number dissected	With nematodes	With *Acuaria* sp.
Passeriformes	958	360	71
Alaudidae	2	1	1
Campephagidae	16	11	2
Turdidae	18	6	4
Monarchidae	4	2	1
Muscicapidae	41	11	1
Pachycephalidae	37	16	2
Falcunculidae	7	7	1
Meliphagidae	189	45	4
Artamidae	10	2	2
Cracticidae	100	53	3
Corvidae	77	69	50
Other families	457	137	—
Caprimulgiformes	18	11	—
Coraciiformes	28	14	—
Strigeiformes	25	17	—
Accipitriformes	61	38	—
Cuculiformes	21	5	—
Columbiformes	43	1	—
Psittaciformes	157	4	—
Galliformes	7	2	—
Gruiformes	56	17	—

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cordon lengths in male and female (different in the two sexes), the shape, size and length ratio of the two spicules, and the number and arrangement of the caudal papillae of the male.

Specimens from other Australian hosts were grouped together according to these characters; in an attempt to compare them with species already described, a key to most of the known species, based on these characters, was compiled. This is given below.

Examination of the shapes of the cuticular bosses in the cordons of the Australian species shows that these may be useful in comparing them. The detailed structure of the cordons, especially as seen in transverse section, has been suggested by Skrjabn *et al* (1949) as a useful generic character in the Acuariidae. Williams (1930) and Rasheed (1960) give figures of the surface pattern in some species (though those in the latter publication are too much reduced to be of critical value). The patterns in each of the Australian species are similar in all specimens, of both sexes.

Acuaria *species from Australian birds*

Alaudidae
MIRAFRA JAVANICA Horsfield. *Acuaria mirafrae* n. sp.
Campephagidae
LALAGE LEUCOMELA Vig. & Hos. *A. petterae* n. sp.
Turdidae
DRYMODES BRUNNEOPYGIA Gould. *A. petterae* n. sp.
Monarchidae
MYIAGRA INQUIETA (Latham). *A. petterae* n. sp.
Falcunculidae
OREOICA GUTTURALIS (Vig. & Hors.). *A. petterae* n. sp.
Meliphagidae
MELIPHAGA VIRESCENS Vieillot. *A. petterae* n. sp.
M. PLUMULA Gould. *A. petterae* n. sp.
ACANTHAGENYS RUFOGULARIS Gould. *A. petterae* n. sp.
Artamidae
ARTAMUS CINEREUS Vieillot. *A. petterae* n. sp.
Pachycephalidae
COLLURICINCLA HARMONICA WHITEI Mathews. *A. colluricinclae* n. sp.
Cracticidae
CRACTICUS NIGROGULARIS (Gould). *A. petterae* n. sp.
STREPERA VERSICOLOR (Latham). *A. streperina* Johnston & Mawson
Muscicapidae
MICROECA LEUCOPHAEA (Latham). *A. microecae* n. sp.
Corvidae
CORVUS CORONOIDES Vig. & Hors. *A. anthuris* (Rud.)
C. MELLORI Mathews. *A. anthuris* (Rud.)
C. BENNETTI North. *A. anthuris* (Rud.)
C. ORRU Bonaparte. *A. anthuris* (Rud.)

Key for identification of male specimens of Acuaria spp.

The descriptions of *A. gagensis* Bisseru and *A. iwashkini* Erhardova are not available to me; a full description has not been seen of *A. eremophila* Erkulov. *A. tenuis* Duj. has been omitted because the cordon length and the number and arrangement of the caudal papillae are not known; it falls among species below choice 14 in the key. Species from crows, *A. attenuata* (Rud.), *A. ornata* (Gendre), *A. longicaudata* Hoeppli & Hsü, and *A. scutata* Maplestone, and synonyms of these, have been assigned to one group, the "*A. anthuris* complex". It is probable that examination of the types of all described species attributed to *Acuaria* would show considerable synonymy, and might also indicate more important differences between some species than are revealed by existing descriptions.

1. Left spicule longer than 190 μm ... 2
1. Left spicule shorter than 190 μm ... 9
2. Spicule ratio 1.1–1.4 ... 3
2. Spicule ratio 1.5 or more ... 5
3. Cordons very long, extending well past oesophagus ... "*A. anthuris* Complex"
3. Cordons very short, not extending much past excretory pore ... 4
4. Body length 4–6 mm, spicule ratio 1.4 ... *A. mavori* Lent, Freitas & Proenca
4. Body length 10–11 mm, spicule ratio 1.1–1.4 ... *A. cordata* (Mueller)
5. Left spicule less than 230 μm long ... 6
5. Left spicule more than 250 μm long ... 7
6. Cordons end about midlength of muscular oesophagus ... *A. subula* (Duj.)
6. Cordons nearly as long as oesophagus ... *A. colluricinclae* n. sp.
7. Left spicule 262 μm ... *A. turdi* (Wang)
7. Left spicule over 300 μm ... 8
8. First pair of postanal papillae about a third tail length from second pair ... *A. cyanocitta* (Boyd)
8. First and second pairs of postanal papillae not much separated ... *A. streperina* J. & M.
9. Spicule ratio 1.5 or over ... 10
9. Spicule ratio less than 1.5 ... 14
10. Cordons reach to end of muscular oesophagus ... *A. conica* Maplestone
10. Cordons very short, not much past excretory pore ... 11
11. Six pairs of postanal papillae ... 12
11. Seven pairs of postanal papillae ... 13
12. Left spicule 165 μm long ... *A. sialia* Williams
12. Left spicule 150 μm long ... *A. papillifera* Linst.

13. Left spicule 140 μm long ... *A. paragalliardi* Ch. & P.
13. Left spicule 170 μm long ... *A. parorioli* Ch. & P.
14. Cordons more or less to end of glandular oesophagus ... 15
14. Cordons hardly longer than muscular oesophagus ... 20
15. Four pairs of preanal papillae ... 16
15. Fewer than four pairs of preanal papillae 18
16. Left spicule 129 μm long ... *A. crami* Rasheed
16. Left spicule longer than 150 μm ... 17
17. Left spicule slightly grooved near tip ... *A. pattoni* Williams
17. Left spicule deeply grooved throughout length ... *A minor* Williams
18. Three pairs of preanal papillae ... *A. brevispicula* Maplestone
18. Two pairs of preanal papillae ... 19
19. Seven pairs of postanal papillae ... *A. alii* Rasheed
19. Six pairs of postanal papillae ... *A. singhi* Rasheed
20. Spicule ratio close to 1.0 ... 21
20. Spicule ratio 1.1–1.4 ... 25
21. Spicule length less than 130 μm ... 22
21. Spicules longer than 130 μm 24
22. Six pairs of postanal papillae ... *A. eremophila* Erkulov
22. Seven pairs of preanal papillae ... 23
23. Cordons not much past nerve ring ... *A. kungi* Singh
23. Cordons reach about to end of muscular oesophagus ... *A. microaecae* n. sp.
24. Cordons not past nerve ring ... *A. martinagliai* Le Roux
24. Cordons nearly to end of muscular oesophagus ... *A upupa* Rasheed
25. Six pairs of postanal papillae ... 26
25. Seven pairs of postanal papillae ... 31
26. Postanal papillae in two groups of three pairs ... 27
26. Postanal papillae not in two distinct groups ... 29
27. Spicule ratio about 1.1 *A. mirafrae* n. sp.
27. Spicule ratio 1.3–1.4 ... 28
28. Caudal alae widen at midlength ... *A. quiscula* Williams
28. Caudal alae about same width throughout ... *A. dollfusi* Ch. & Petter
29. Cordons reach only to cervical papillae ... *A. cettiae* Hsü
29. Cordons reach further than cervical papillae ... 30
30. Right spicule grooved for most of its length ... *A. gracilis* (Gendre)
30. Right spicule simple *A. dicrura* Rasheed
31. Three pairs of preanal papillae ... *A. brumpti* Ch. & Petter
31. Four pairs of preanal papillae ... 32
32. Left spicule less than 125 μm long ... *A. galliardi* Ch. & Petter
32. Left spicule more than 135 μm long ... 33
33. End of right spicule enlarged ... *A. skrjabini* Ozerska
33. Tip of right spicule without prominent enlargement ... 34
34. Cordons reach past excretory pore, and more than half distance between head and posterior end of muscular oesophagus ... *A. buttnerae* Ch. & Petter
34. Cordons shorter, less than half this distance ... 35
35. Parasitic in African oriole ... *A. orioli* Ch. & Petter
35. Parasitic in Australian passerines ... *A. petterae* n. sp.

Descriptions of Species

The general morphology of *Acuaria* spp. is so similar that only the special features of each species will be described. Measurements are given in Table 2; those of parts of the oesophagus are taken from the anterior end of the body to the end of the organ in question; the spicules are measured in lateral view (often very different from those taken in ventral view).

Acuaria anthuris (Rudolphi, 1819)

FIGS. 1–3

Hosts and localities: *Corvus coronoides* from Adelaide and Pt. Augusta, S. Aust.; *C. mellori* from Balgowan, S. Aust. and Launceston, Tas.; *C. bennetti* from Lock, S. Aust. and Erldunda, N.T.; *C. orru* from Plenty River, N.T.; *C.* sp. from Pearson I., S. Aust.

Acuaria anthuris has been recorded many times from different parts of the world; reference lists and discussion of its synoymy may be found in Skrjabin *et al* (1965) and Chabaud & Petter (1961). The present study deals only with the variations observed in the Australian specimens. The species is quite common in Australian crows and ravens. Measurements are given in Table 2. The general appearance, except where noted below, agrees with descriptions given by Singh (1948), Rasheed (1960) and Chabaud & Petter (1961).

The cordons extend well past the oesophagus in both sexes, reaching a little under a third of the body length in the male and a little more than this in the female, but never quite reaching to the vulva. The cordon structure (Fig. 1) is different from that figured by Rasheed.

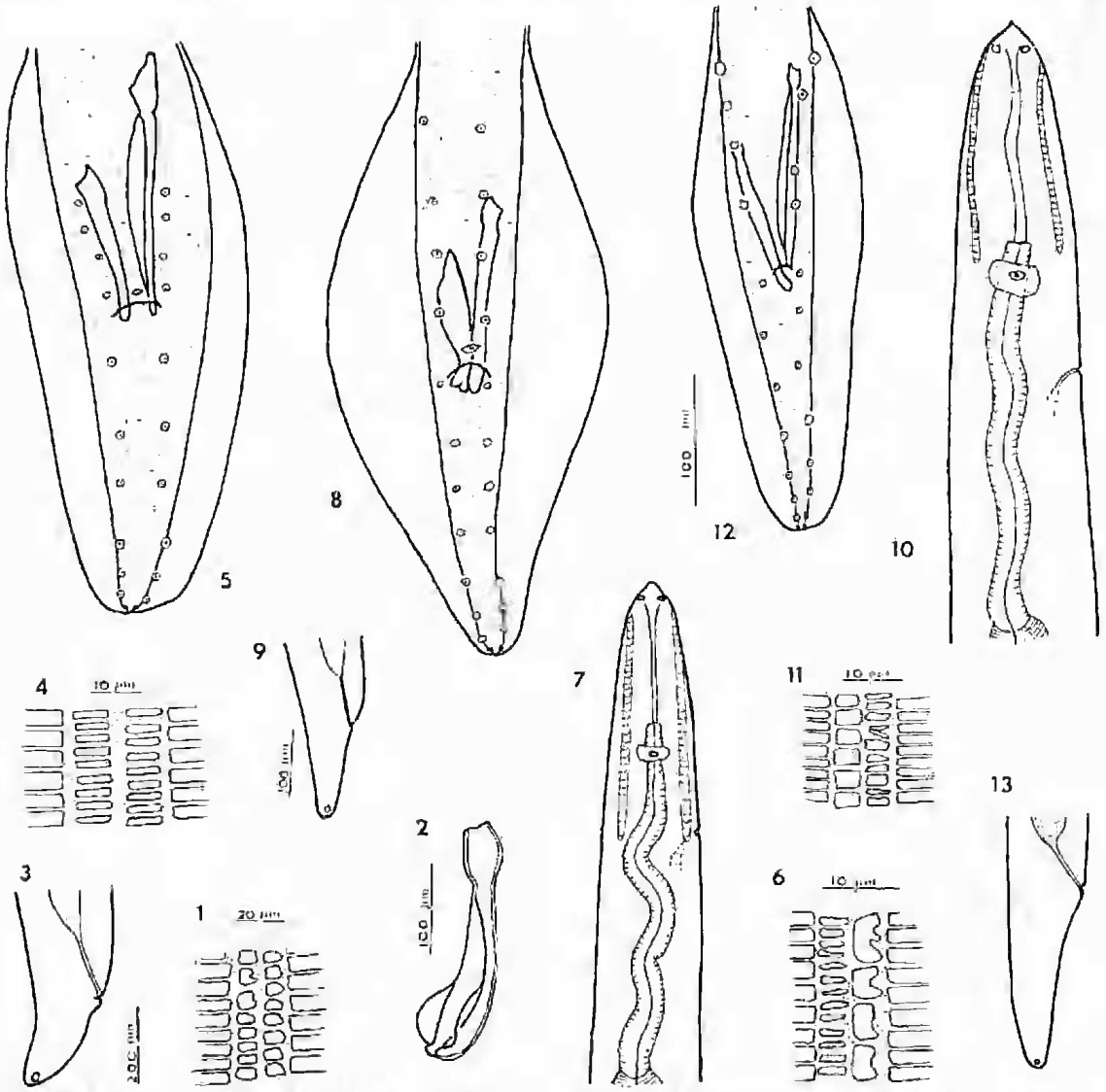
The papillae on the male tail are usually more or less symmetrical, comprising four pairs and one median preanal papillae, and six pairs of postanal papillae, arranged as three pairs on the anterior half of the tail and three pairs of rather smaller papillae on the last

TABLE 2

Measurements of Acuaria *spp. Unless otherwise stated all measurements are in μm.*

		Acuaria anthuris range	(mean)	*Acuaria skrjabini*	*Acuaria streperina*	*Acuaria petterae* range	(mean)	*Acuaria colluri-cinclae*	*Acuaria microecae*	*Acuaria mirafrae*
Male	Length (mm)	9.7–13.4	(11.4)	7.1–9.0	—	5.1–6.9	(5.9)	6.8	4.6	
	Oesophagus	2500–4400	(2900)	1200–1900		1000–1500	(1259)	2300	1500	1330, 1760
	Musc. oesoph.	700–1080	(924)	420–730		400–610	(514)	700	460	480, 620
	Vestibule	200–280	(248)	130–170		150–180	(165)	170	120	150, 170
	Antr. end—nerve ring	300–360	(323)	150–215		175–225	(202)	200	165	185, 210
	—cerv. pap.	270–430	(330)	140–200		160–210	(193)	190	170	175, 200
	—excr. p.	380–530	(461)	220–330		240–320	(276)	330	260	270, 280
	L. spicule	230–310	(274)	190–200		140–185	(171)	210	100	140, 140
	R. spicule	190–270	(226)	110–140		110–140	(130)	130	100	130,125
	L. spic./R. spic.	1.1–1.4	(1.2)	1.4–1.7		1.2–1.4	(1.3)	1.6	1.0	1.1, 1.1
	Cordon length	3200–4500	(4100)	200–330		120–295	(197)	2000	460	270, 330
	L/oesoph. length	2.8–4.8	(3.9)	4.5–6.0		4.0–6.3	(4.7)	2.9	3.0	4.5, 4.3
Female	Length	19.1–30.3	(25.4)	23.9–28.4	16.8	16.0–24.9	(21.5)	12.4	21.1	—
	Oesophagus	3000–5000	(4200)	1500–2000	3200	1620–2600	(2096)	3.5	2.6	
	Musc. oesoph.	1000–1500	(1291)	600–1200	830	800–980	(864)	1200	900	
	Vestibule	250–350	(302)	160–200	210	210–230	(219)	250	160	
	Antr. end—nerve ring	300–530	(408)	180–240	300	260–300	(274)	320	225	
	—cerv. pap.	320–600	(437)	180–240	330	200–300	(266)	290	190	
	—excr. p.	550–800	(662)	260–330	450	320–400	(371)	420	330	
	—vulva (mm)	8.8–14.9	(11.5)	11.2–14.9	8.8	8.7–12.5	(10.8)	6.6	10.9	
	Antr.—Vulva, as % length	43–50%	(45.6%)	44–52%	52.4%	46.8–50.8	(48.4%)	53.2	51.6	
	L./oesoph. length	4.9–7.6	(6.2)	12.8–15.7	5.5	8.7–14.4	(10.7)	3.6	8.1	
	Cordon length	5600–9200	(8400)	200–450	1900	250–380	(350)	2500	1600	

quarter of the tail, as well as a pair of very small phasmids almost terminally. The members of a postanal pair are not always strictly opposite to one another. Individual variations from this occur, some specimens having one or two papillae missing from one side or the other. Of 85 male worms examined, 18 showed some abnormality in the caudal papillae. Most of these were one papillae more or less on one side or the other; in a few there was one papilla more or less in the terminal group of postanal papillae. In three specimens there were six pairs in the preanal group, the most posterior of these lying just posterior to the anus, so that they could be regarded as an extra postanal pair except that they continued as a closely spaced line of small preanal papillae on each side and were quite separated from the larger papillae of the anterior group of postanal papillae which were further apart. Except for these three specimens, all had six pairs of postanal papillae, of which the anteriormost lay



Figs. 1–3. *Acuaria anthuris*. Fig. 1.—Part of a cordon. Fig. 2.—Right spicule. Fig. 3.—Tail of female.
Figs. 4–5. *A. streperina*. Fig. 4.—Part of a cordon. Fig. 5.—Posterior end of male.
Figs. 6–9. *A. skrjabini*. Fig. 6.—Part of a cordon. Fig. 7.—Anterior end of male. Fig. 8.—Posterior end of male. Fig. 9.—Tail of female.
Figs. 10–13. *A petterae*. Fig. 10.—Anterior end of male. Fig. 11.—Part of a cordon. Fig. 12.—Posterior end of male. Fig. 13.—Tail of female.
Figs. 2, 5, 7, and 13 to scale beside 2; figs. 8, 10, 12, and 13 to scale beside 12.

some distance behind the anus. The spicules are grooved (as described by Singh 1948) and alate (Fig. 2). The left spicule is larger than the right except at the tip and the expanded parts of the alae are wider.

Chabaud & Petter (1961, p. 210) report *A. anthuris* of two types; the first (from *Garrulus glandarius* and *Pica pica*), rather smaller, with six pairs of postanal papillae in the male; the second (from *Corvus corone*), larger and with seven pairs of postanal papillae, in addition to the phasmids. The only measurement given is that the males of the smaller specimens are less than 12 mm long. The smaller specimens agree with Rudolphi's specimens selected from material (apparently containing more than one species), by Schneider (1866) as the type for *A. anthuris*. The Australian material, though perhaps a little longer, agrees with these types.

Acuaria streperina Johnston & Mawson, 1941: 254.

FIGS. 4–5

Host and locality: *Strepera versicolor melanoptera* from Waikerie, S. Aust.

The type specimens of *A. streperina* have been re-examined and the original description must now be amended; they are old specimens, poorly fixed and much contracted. The length given for the oesophagus, 700 μm in the male and 800 μm in the female, is that of the muscular part of the organ; the end of the glandular part is 2.1 mm from the head in the female, which is strongly contracted, and 1.4 mm in the male, which is less so. The cordons reach nearly to the end of the oesophagus in the female, and to the end of the muscular oesophagus in the male. There are six (not five) pairs of posteloacal papillae in the male, arranged with three well spaced pairs on the proximal two-thirds of the tail and three pairs, closer together, on the distal third. The papillae of the latter group are much smaller and harder to find. The spicules each have an enlarged proximal end, which is less heavily chitinised and was apparently not included in the original measurements. The spicules are 310 μm and 180 μm long, with a ratio of 1:1.7. The largest eggs are 45 x 28 μm.

A single female worm from the type host species is referred to *A. streperina*. It was collected and fixed after death and so is in a relaxed condition. Its measurements are different in those of the type female largely because of this. Eggs in this specimen are not embryonated and are thin-shelled. Measurements are given in Table 2.

The species is very close to *A. cyanocitta* (Boyd, 1950) but is distinguished by the arrangement of the postanal papillae in the male.

Acuaria skrjabini Ozerska, 1926: 103-111; *vide* Skrjabin *et al.*, 1965: 114.

FIGS. 6–9

Hosts and locality: Exotic aviary finches from New South Wales: *Tiaris canora*, *Lonchura malacca* and *Estrilda melpoda*.

These specimens occurred in large numbers in many specimens of the finches and were considered by the owner of the aviary to be the cause of the death of the birds. They agree generally with the figures and description of *A. skrjabini* by Ozerska and also by Singh (1948), the principal differences being that there are 7 pairs of postanal papillae in the male, as described by Singh, not six as shown by Ozerska; the spicule ratio is nearer that in Ozerska's specimens than those of Singh. There is a distinct enlargement at the distal end of the right spicule.

The cordons in the male reach to, and usually beyond, the excretory pore, and those of the female are longer, reaching to about half the distance from the head to the end of the muscular oesophagus.

The caudal alae of the male are distinctly wider anteriorly. There is only a slight distinction in spacing between the first four postcloacal papillae and the last three. In some specimens the posteloacal pairs are not arranged symmetrically and in a few one member of a pair is absent. Both spicules are indented at the tips and this is clearer in the right spicule as it ends more broadly.

The egg size is 40–43 by 23–24 μm; this is rather shorter than Ozerska's measurements, and distinctly larger than those of Singh.

Acuaria petterae n. sp.

FIGS. 10–13

Hosts and localities: *Lalage leucomela* from Katherine Gorge, N.T., type host; *Meliphaga virescens*, *M. plumula* and *Cracticus nigrogularis* from the Petermann Ranges, N.T.; *Artamus melanops* from Alice Springs, N.T.; *Cinclosoma cinnamomeum* from Tobermory Stn., N.T.; *Myiagra inquieta* and *Drymodes brunneopygia* from Blanchetown, S. Aust.

Probable hosts and localities (only females present): *Acanthogenys rufogularis* from Blanchetown, S. Aust.; *Anthochaera carun-*

culata from Verran, S. Aust.; *Artamus melanops* from Port Augusta, S. Aust.; *Oreoica gutturalis* from the Petermann Ranges, N.T.

Although the hosts listed above cover a wide range of bird groups, and a wide geographical range, there appear to be no specific differences among the specimens from each. Although there is some variation in the position of the cervical papillae, and in the length of the cordons in the male, there is often as much variation between specimens from one host as between specimens from different hosts.

The cordons are short. They do not extend as far as the nerve ring in the male, or further than the excretory pore in the female.

The vulva is at about the mid-body, just in front of or just behind this. The vagina passes backwards. Eggs are 38–39 by 21–23 μm.

The caudal alae of the male are slender and only slightly wider in their anterior halves. There are typically four pairs and one median preanal papillae, seven pairs of postanal papillae and a pair of very small phasmids. The postanal papillae are not arranged in two groups, but lie progressively closer together towards the tip of the tail. In some specimens there are more or fewer papillae on one side or the other, but these appear to be abnormalities. The spicules are unequal; the tips of both are blunt and rounded. The species appears to be very close to *A. orioli* Chabaud & Petter (1961), based on specimens from an oriole from Dahomey, which had been placed (with reserve) by Gendre (1912) in his species *A. gracilis*, from *Buchanga atra* from the same locality. Gendre states that the specimens from the oriole were in nearly all points similar to those from the drongo, distinguished only by the number of postanal papillae in the male, and the shape of the tip of the male tail. The cordons of *A. orioli* are longer in both sexes, than those of the Australian specimens. In the absence of more information about *A. orioli*, the Australian specimens are regarded as a distinct species. In some ways it resembles *A. skrjabini* but differs from this species in the more slender build of the spicules, the unenlarged tip to the right spicule, the shape of the caudal alae, and the detailed structure of the cordons.

Acuaria colluricinclae n. sp.

FIGS. 14–16

Host and locality: *Colluricincla rufiventris* from Eyre Peninsula, S. Aust.

The material consists only of one male and one female specimen, but these differ distinctly from *A. petterae* which appears to be the commonest species of the genus in Australian passerines. Measurements are given in Table 2.

The cordons extend nearly to the posterior end of the glandular oesophagus in both sexes, a little nearer in the female. Detail of the cordon structure are shown in Fig. 14.

The spicules are unequal in length; the right spicule ends in a swollen tip. There are four pairs and one median preanal papillae, 6 pairs of postanal papillae, and one pair of phasmids. The postanal papillae are asymmetrical (Fig. 15), presumably an abnormal condition; the first 3 pairs are well spaced and spread over the anterior 220 μm of the 280 μm long tail, while the last 3 pairs are smaller and lie on the terminal 50 μm.

The species is distinguished from other Australian ones by the ratio of the spicules, the structure of the right spicule, the grouping of the postanal papillae, and the cordon length. It is distinguished from other close species as shown in the key to species.

Acuaria microecae n. sp.

FIGS. 17–20

Host and locality: *Microeca leucophaea* from Waikerie, S. Aust.

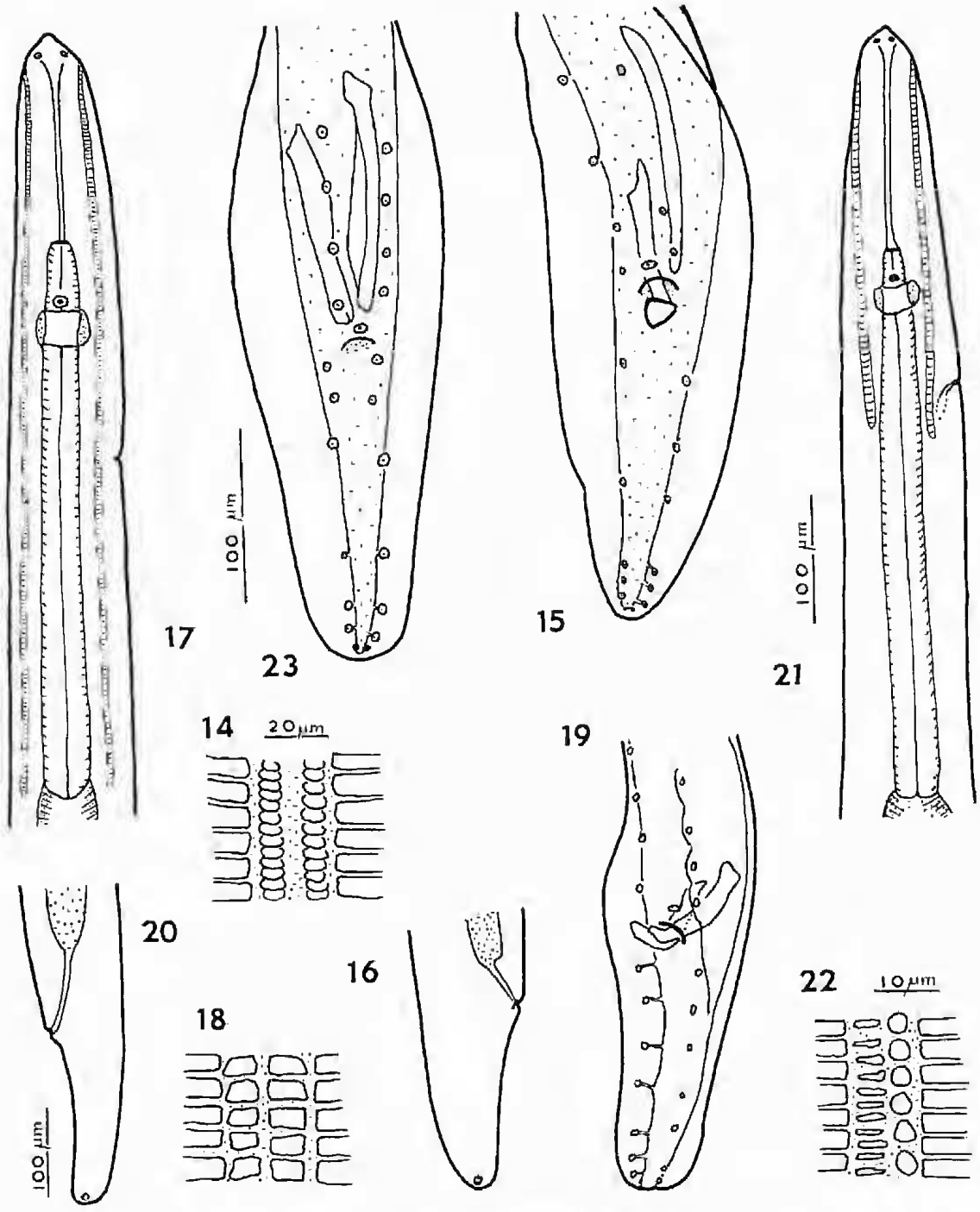
The measurements of this species, of which only 1 male and 1 female are present, are given in Table 2.

The cordons of the male reach to the end of the muscular oesophagus; those of the female to about halfway between the head and the posterior end of the glandular oesophagus.

There are four pairs and one median preanal papillae, seven pairs of postanal papillae and a pair of subterminal phasmids. The postanal papillae on each side are more or less evenly spaced along the tail, the posterior ones slightly closer together. The spicules are equal in length and similar in build; each has a pair of short alae towards the distal end, and the rounded tip is bent ventrally.

The vulva is slightly behind the midbody; the eggs are 35 x 21 μm.

The species is distinguished from others from Australia by the presence of equal spicules. It differs from other species in which the spicules are equal and in which there are 7 pairs of postanal papillae, in having longer cordons and in the very short spicules.



Figs. 14–16. *Acuaria colluricinclae*. Fig. 14.—Part of a cordon. Fig. 15.—Posterior end of male. Fig. 16.—Tail of female.

Figs. 17–20. *A. microecae*. Fig. 17.—Anterior end of male. Fig. 18.—Part of a cordon. Fig. 19.—Posterior end of male. Fig. 20.—Tail of female.

Figs. 21–23. *A. mirafrae*. Fig. 21.—Anterior end of male. Fig. 22.—Part of a cordon. Fig. 23.—Posterior end of male.

Figs. 15, 19, and 21 to scale beside 21; figs. 16 and 20 to scale beside 20; figs. 17 and 23 to scale beside 23; figs. 18 and 22 to scale beside 22.

Acuaria mirafrae n. sp.

FIGS. 21–23

Host and locality: *Mirafra javanica* from the Northern Territory.

This collection comprises only two whole and one broken male worms. Measurements are given in Table 2.

The cordons extend a short distance behind the excretory pore. The detail of the cordon pattern (Fig. 22) is somewhat similar to that of *A. petterae*.

There are four pairs and one median preanal papillae, six pairs of postanal papillae and a pair of subterminal phasmids. The postanal papillae are arranged in two groups of three pairs. The right spicule ends bluntly and the tip is slightly indented.

The species is distinguished from *A. petterae* by the number of postanal papillae and by the rather longer cordons. It is close to *A. gracilis* Gendre in the body measurements, but differs in the spicule ratio and the arrangement of the postanal papillae.

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